

10578-92

[This Drawing is a reproduction of the Original on a reduced scale.]

10578-1893
SHEETS
1892

195. ALCOHOL.
Mashing-
Processes.

Fig.1.

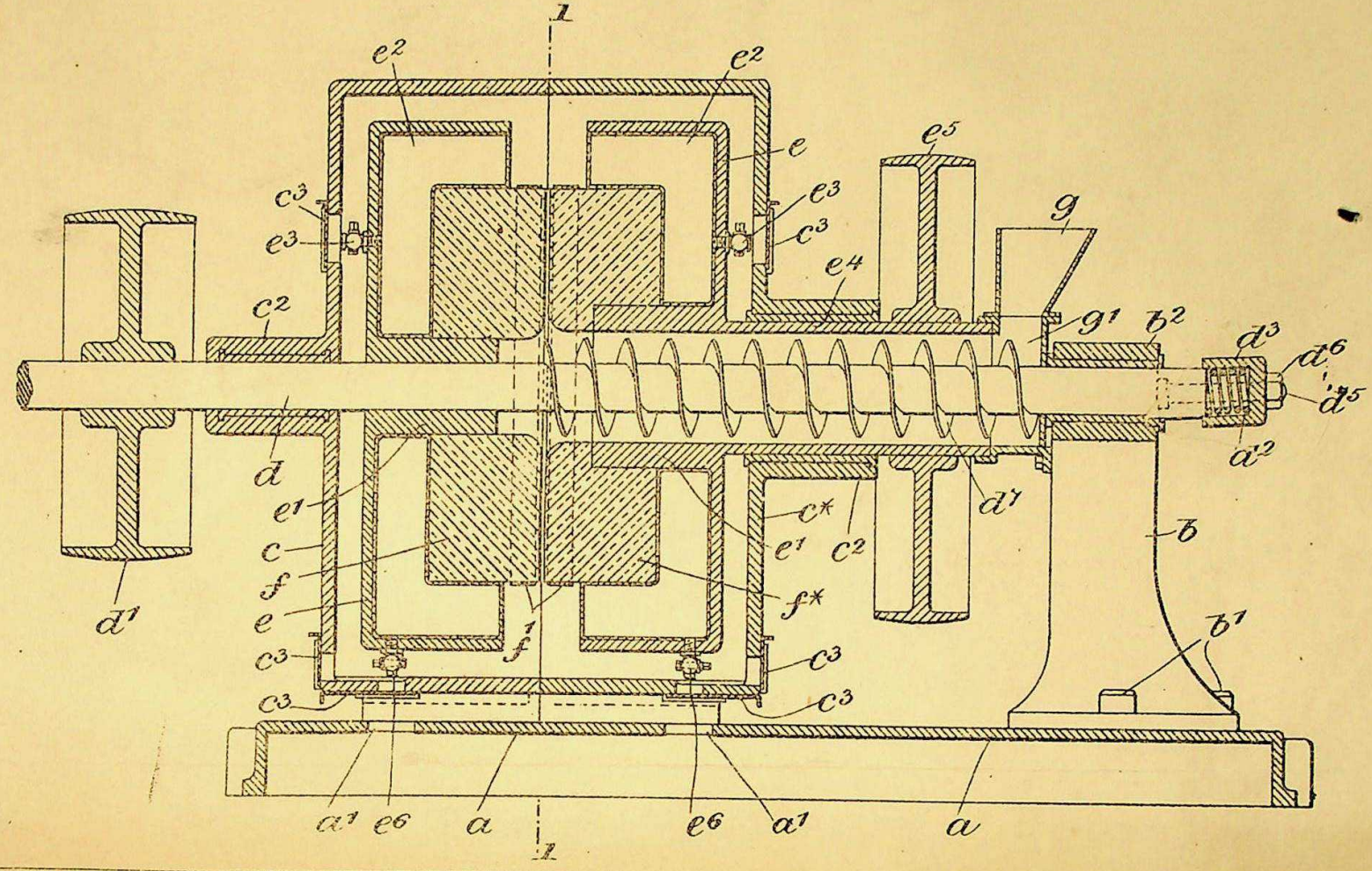


Fig.2.

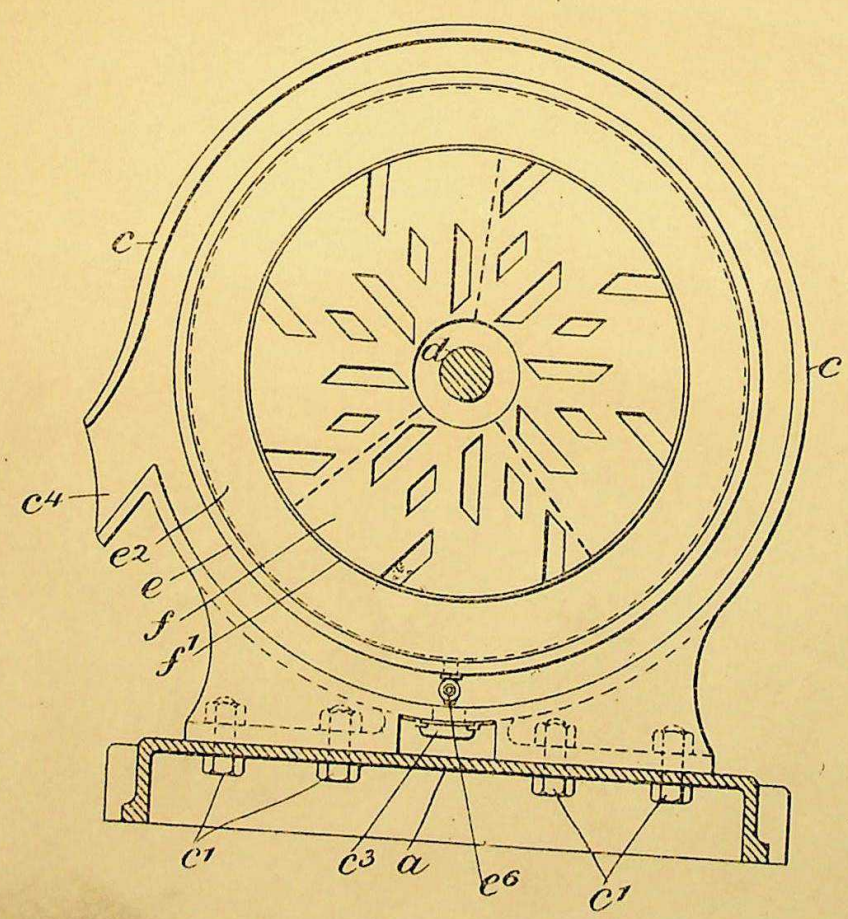
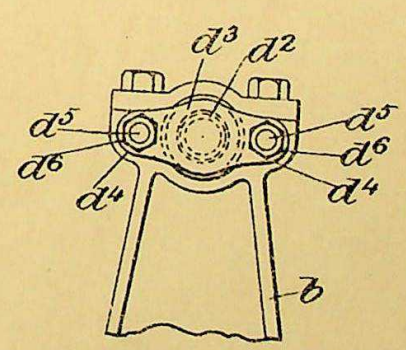


Fig.3.



A.D. 1892. JUNE 2. N° 10,518.
GARNER & another's COMPLETE SPECIFICATION.

195. ALCOHOL.
Mashing-
Processes.

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RECORDED

N^o 10,518

A.D. 1892

Date of Application, 2nd June, 1892

Complete Specification Left, 2nd Mar., 1893—Accepted, 27th May, 1893

PROVISIONAL SPECIFICATION.

Improvements in the Treatment of Grain or Cereals in order to render them Suitable for Various Useful Purposes, such as Brewing, Distilling, and Vinegar Making, or as Articles of Food, and in Means or Apparatus to be employed therein, and for like uses.

We, WILLIAM GARNER Manager, and ALBERT EDWARD GARNER Mill Stone Builder, both of 1 Locksley Street, Limehouse in the County of Middlesex do hereby declare the nature of this invention to be as follows:—

5 The invention relates to improvements in the treatment of grain or cereals in order to render them suitable for various useful purposes such as brewing, distilling and vinegar making, or as articles of food, and in means or apparatus to be employed therein and for like uses.

10 In order to render rice or other grain or cereals suitable for brewing, distilling, or vinegar making or for some food purposes, it is necessary to convert or gelatinize the starchy constituents thereof as is well understood, and various means have been proposed to accomplish this end, but they are all more or less expensive and defective from various causes, and the object of our present invention is to accomplish the desired end in a simpler, more economical, and more efficient manner than heretofore.

15 For this purpose we employ a grinding mill consisting of two mill stones arranged vertically in relation to a horizontal shaft or axis, and each of these stones we surround upon its periphery and outer end with a pan or casing whilst in the end of each pan or casing, and it might be around the periphery thereof, we employ a steam or water jacket into which we introduce steam at high pressure or boiling

20 water in order to heat the stones for the purpose hereinafter described. One of these stones may be fixed and the other may be caused to revolve, or they may both be caused to revolve either in opposite directions or both in the same direction but at differential speeds.

25 The grain or cereal to be treated, and from which the germ has been previously removed in any suitable manner is submitted to any well known steaming operation preferably in a closed cylinder, and when it is sufficiently cooked or partially converted it is fed in between the stones through the eye or centre of one of them, one or both of the stones being caused to revolve at a high rate of speed and when feeding through a revolving stone we mount the same upon a hollow shaft and feed

30 therethrough. The steam or other heating medium is now cut off from the jackets, the stones having been heated thereby to the required temperature, and which is now maintained by the friction of the revolving stones upon the material between them, the action of the stones reducing the material to the required consistency, and at the same time by reason of the heat given off thereby, completely converting the starchy constituents of such material.

The material after being submitted to the treatment hereinbefore described, may be afterwards further dried in any suitable drying apparatus.

35 By these means we ensure the complete conversion of the starchy constituents of the material under treatment, and thereby obtain a better product than heretofore.

The apparatus hereinbefore described may be usefully employed in the treatment of other similar materials than those hereinbefore referred to.

Dated this 2nd day of June 1892.

WHITE & WOODINGTON,
27, Southampton Buildings, London, Agents.

COMPLETE SPECIFICATION.

Improvements in the Treatment of Grain or Cereals in order to render them Suitable for Various Useful Purposes, such as Brewing, Distilling, and Vinegar Making, or as Articles of Food, and in Means or Apparatus to be employed therein, and for like uses.

We, WILLIAM GARNER, Manager, and ALBERT EDWARD GARNER, Mill Stone Builder, both of 1 Locksley Street Limehouse in the County of Middlesex, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to improvements in the treatment of grain or cereals, in order to render them suitable for various useful purposes, such as brewing, distilling, and vinegar making, or as articles of food, and in means or apparatus to be employed therein, and for like uses.

In order to render rice or other grain or cereals suitable for brewing, distilling, or vinegar making, or for some food purposes, it is necessary to convert or gelatinize the starchy constituents thereof as is well understood, and various means have been proposed to accomplish this end, but they are all more or less expensive and defective from various causes, and the object of our present invention is to accomplish the desired end in a simpler, more economical, and more efficient manner than heretofore.

For this purpose we employ a grinding mill consisting of two mill stones arranged vertically in relation to a horizontal shaft or axis, and each of these stones we surround upon its periphery and outer end with a pan or casing, whilst in the end of each pan or casing and around the periphery thereof, we employ a steam or water jacket, into which we introduce steam at high pressure, or boiling water, in order to heat the stones for the purpose hereinafter described.

One of these stones may be fixed, and the other may be caused to revolve, or they may both be caused to revolve either in opposite directions, or both in the same direction, but at differential speeds.

The grain or cereal to be treated, and from which the germ has been previously removed in any suitable manner is submitted to any well known steaming operation, preferably in a closed cylinder, and when it is sufficiently cooked or partially converted, it is fed in between the stones, through the eye or centre of one of them, one or both of the stones being caused to revolve at a high rate of speed, and when feeding through a revolving stone, we mount the same upon a hollow shaft and feed therethrough.

The steam or other heating medium is now cut off from the jackets, the stones having been heated thereby to the required temperature, and which is now maintained by the friction of the revolving stones upon the material between them, the action of the stones reducing the material to the required consistency, and at the same time by reason of the heat given off thereby, completely converting the starchy constituents of such material.

The material, after being submitted to the treatment hereinbefore described, may be afterwards further dried in any suitable drying apparatus.

And in order that the said invention may be more clearly understood and readily carried into effect, we will proceed, aided by the accompanying drawings, more fully to describe the same.

DESCRIPTION OF THE DRAWINGS.

Figure 1 is a vertical longitudinal section of an apparatus constructed according to the present invention.

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Figure 2 is a vertical transverse section thereof taken on the line 1—1 of Figure 1, and

Figure 3 is an end elevation of part thereof.

In the several figures like parts are indicated by similar letters of reference.

- 5 *a* represents the base plate or foundation of the mill or apparatus, *b* represents a standard secured to the base *a* by bolts *b*¹, *c* represents one half of a casing or chamber enclosing the mill stones, and *c*^{*} represents the other half thereof, the two parts *c c*^{*} being secured to the base *a* by means of bolts *c*¹, so as to be capable of being readily placed in position and separated or removed when required.
- 10 Each part *c c*^{*} of the casing or chamber is axially perforated, and that part *c* is coincident with such perforation furnished with a tubular extension *c*² constituting a bearing, whilst the upper part of the standard *b* is provided with a similar bearing *b*², and passing axially through the casing *c c*^{*}, and mounted with capability of revolution in the bearings *b*^{2 c}² is a horizontal shaft *d* which is driven through a
- 15 pulley *d*¹ fixed thereon from a steam engine, or other source of power.

Within that part *c* of the casing or chamber is arranged a pan or casing *e* formed with a central tubular boss *e*¹ by means of which the pan *e* is fixed with the shaft *d*, and upon the boss *e*¹ is mounted and fixed a mill stone *f*, which is built up in sections as represented by the dotted lines in Figure 2, and around this mill stone is shrunk

20 an iron band *f*¹ as is well understood.

The pan or casing *e* surrounds the stone *f* almost entirely around its periphery, and upon its outer end and between the pan or casing *e* and the mill stone *f* is provided a water and steam tight jacket *e*², and the stone *f* is further secured with relation to the pan *e*, by cementing it at its end and around its periphery to the wall

25 of the jacket *e*².

The pan or casing *e* has fixed thereto a cock or valve *e*³, which communicates with the jacket *e*², and that part *c* of the chamber is provided with an opening covered by a sliding door *c*³, by the aid of which when the pan *e* is in a given position, access may be had to the cock or valve *e*³ when a hose or pipe may be

30 connected therewith, the cock *e*³ may be turned on, and steam under pressure or boiling water may be introduced into the jacket *e*², after which the cock *e*³ may be turned off, and the communication broken, and the door *c*³ again closed.

The other half *c*^{*} of the chamber is furnished with similar parts to those hereinbefore described, but in this case, the boss *e*¹ of the pan *e* is formed of larger

35 diameter than that hereinbefore referred to, in order to afford a clear way through the eye of the stone *f*^{*}, for the purpose hereinafter described, and the stone at that part is recessed to receive the boss *e*¹, whilst upon the outer end of the pan *e* is provided a tubular extension *e*⁴ which constitutes a hollow shaft and which is mounted in the bearing formed by the extension *c*² of that part *c*^{*} of the chamber,

40 and which is driven through a pulley *e*⁵ from the same source of power which drives the shaft *d*.

By this arrangement of parts one of the stones *f f*^{*} may if desired be fixed, and the other may be caused to revolve or they may both be caused to revolve either in opposite directions by simply crossing one of the driving bands giving motion to

45 one of the pulleys *d*¹ or *e*⁵, or they may both be caused to revolve in the same direction but at differential speeds, by employing the arrangement of parts represented in the drawings, and arranging the driving bands accordingly.

In order to keep the stones *f f*^{*} apart when they are running empty, or the feed is stopped from any cause, and thus to avoid injury to the stones, one end of the

50 shaft *d* is reduced, and upon such reduced part is mounted a coiled spring *d*², whilst over this coiled spring and upon the reduced part of the shaft is mounted a perforated cap *d*³ which is furnished with perforated lugs *d*⁴ to receive bolts *d*⁵ fixed in the standard *b*, and upon the ends of which are screwed nuts *d*⁶ whereby the cap *d*³ is secured in position and the spring *d*² is more or less compressed according

55 to the force required to keep apart the stones *f f*^{*} as hereinbefore described, whilst the opposite end of the shaft *d* is fitted with a screw adjustment (not shown) as is

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well understood in order to regulate the distance between the faces of the stones ff^* .

The grain or cereal to be treated, and which is generally broken grain, and from which the germ has previously been removed in any suitable manner is submitted to any well known steaming operation preferably in a closed cylinder, and when it is by that means sufficiently cooked or its starchy constituents are partially converted, it is fed by means or any automatic feed capable of regulation, and such as a "shoe" feed, into a hopper g which terminates in a chamber g^1 located at the end of the hollow shaft e^4 , and the material is thus conducted into the hollow shaft e^4 , and by means of a screw conveyer d^7 fixed to the shaft d and revolving within the hollow shaft e^4 is thereby carried forward through the hollow shaft e^4 and the eye of the stone f^* , into position to be acted upon by both of the stones.

The steam or other heating medium, having been introduced into the jackets e^2 in the manner hereinbefore described, is now cut off, the stones ff^* having presumably been heated thereby to the required high temperature, and this temperature is now maintained by the friction of the revolving stones upon the material between them, one or both of such stones revolving at a high rate of speed, the action of the stones reducing the material to the required consistency, and at the same time by reason of the heat given off by the stones completely converting the starchy constituents of such material.

The material passing through the stones ff^* finds an exit from the chamber $c c^*$ by the outlet c^4 in a practically dry state, whence it may by means of any well known conveyer, be conveyed away as finished material or carried to a suitable drying apparatus where it may be further dried.

When employing water as the heating medium it will be advisable to draw off the same from the jackets e^2 when the stones are sufficiently heated, and for this purpose each pan e is provided at its periphery with a cock e^6 communicating with the jacket, and which when the pans e are turned into a given position comes into alignment with an opening in the bottom of the chamber $c c^*$ normally closed by a sliding cover c^3 and which cock e^6 may be opened by means of a suitable key introduced through an opening in the end wall of the chamber $c c^*$ closed by a sliding door c^3 when the water contained within the jacket e^2 will flow out through the cock e^6 and away by the corresponding opening in the chamber and which is opened by drawing back the cover c^3 , and it will thence pass through a corresponding opening a^1 provided in the base or foundation a , whence it may be conducted away as desired, and in the same manner the water of condensation from steam introduced into the jackets e^2 may be similarly removed.

We are aware that partially cooked or converted material has heretofore been passed through revolving stones with a similar object to that we have in view, but the result was far from satisfactory, inasmuch as the revolving stones never acquired by simple friction sufficient heat to produce the required conversion of the material under treatment whilst by our method hereinbefore described, we first heat the stones to the required high degree to ensure perfect conversion of the material, and this degree of heat is afterwards maintained by the friction of the revolving stones.

Furthermore when the stones are not previously heated but the simple friction consequent on running is relied upon to heat them, inasmuch as the stones cannot be run empty there is necessarily a considerable waste of material passed through the mill before the stones reach the highest degree of temperature obtainable in that manner without danger of firing and which temperature as above pointed out is insufficient for proper conversion.

Many processes have been suggested for the complete conversion of grain or cereals, and such as steaming in closed vessels, but we have found in practice that the simple steaming in a closed vessel is not reliable, as it does not efficiently act upon every particle of grain, whereas, by the employment of a preliminary steaming coupled with the subsequent process of reducing the material between previously

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heated stones, we obtain the complete conversion of the starchy constituents of the material under treatment, and thereby obtain a far better product than heretofore.

It will be understood that the apparatus hereinbefore described, may be usefully employed in the treatment of other grain or cereals than those hereinbefore referred to.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

- 10 1. In the treatment of grain or cereals, first partially cooking or converting the material by any known process, and then completing such conversion by passing the same through a vertical mill working at a high rate of speed in which the stones have been previously heated to a high temperature by artificial means, substantially as herein shown and described and for the purpose stated.
- 15 2. In the treatment of grain or cereals which have been previously partially cooked, the employment of millstones, one or both of which travels or travel at a high rate of speed, and which have been artificially heated to the required high temperature substantially as herein shown and described, and for the purpose stated.
- 20 3. In an apparatus for the treatment of grain, the combination with two vertical millstones one or both of which is or are adapted to travel at a high rate of speed, of surrounding water or steam jackets substantially as herein shown and described and for the purpose stated.
- 25 4. In an apparatus for the treatment of grain or cereals, the combination of two vertical millstones mounted upon separate shafts with capability of differential motion, a hollow shaft communicating with the eye of one stone, a feed screw working therein, a pan fixed upon each shaft, a jacket between the pan and the stone, and surrounding the stone, suitable ways for the admission and exhaustion of water or steam to and from the jackets, and a casing for enclosing the principal parts of the apparatus substantially as herein shown and described.

30 Dated this 2nd day of March 1893.

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